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PATENT APPLICATION
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION OF)
WINFRIED JESKE ET AL) GROUP NO.: 1713
SERIAL NUMBER: 09/575,051) EXAMINER: R. HARLAN
FILED: MAY 19, 2000) RESPONSE TO PAPER #17
TITLE: DIENE RUBBER COMPOUNDS)
FOR IMPROVED RUBBER)
MOLDINGS)

APPEAL BRIEF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450
Sir:

This Brief, submitted in triplicate, is an Appeal from the Final Office Action dated March 3, 2003, in which Claims 1-14 were rejected.

I. REAL PARTY IN INTEREST

Each of the inventors has assigned his rights in this application to Bayer AG, a German Corporation. The real party in interest in this Appeal is therefore Bayer AG.

II. RELATED APPEALS AND INTERFERENCES

There are no pending appeals or interferences of which Appellants are aware that would be affected by or have a bearing on the Board's Decision in this Appeal.

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on 7/24/03

Date

Jennifer R. Seng, Reg. No. 45,851

Name of applicant, assigned or
Registered Representative

Signature

July 24, 2003

Date

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III. STATUS OF CLAIMS

Claims 1-14 remain pending and are subject to this Appeal.

IV. STATUS OF THE AMENDMENT

According to page 2, paragraph 1 of the Final Office Action, Appellants' amendment filed on 2/19/03 was entered in which Claims 12-14 were added. (Please note the Final Office Action summary erroneously states Claims 1-11 are pending. Therefore, Appellants submit that the Final Office Action erroneously rejected Claims 1, 5 and 6 under 35 U.S.C. § 112, second paragraph because the rejected phrases, "such as" and "customary" were deleted in Claims 1, 5 and 6 in the amendment dated 2/19/03 that was entered.

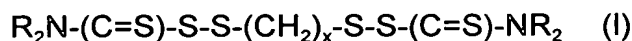
V. SUMMARY OF THE INVENTION

The present invention relates to vulcanizable rubber compounds, which exhibit a high capacity for the addition of sulfur to be varied while guaranteeing that processability is maintained, for the production of improved tire components. As a result, the rubber compounds release no nitrosamines during vulcanization, which are carcinogenic to humans. The vulcanized materials resulting from the rubber compounds are free from the undesirable odors of organosulfur compounds, and not only do the vulcanized materials exhibit no deterioration, or exhibit only a slight deterioration of their technological properties during aging, but they are even improved before aging with respect to modulus and resistance to tear propagation, without deterioration of their other important technological properties, such as the loss factor $\tan \delta$ at 70°C or the heat build-up.

In this connection, it should be explained that the modulus and the resistance to tear propagation are usually diametrically opposed to each other, i.e. vulcanized materials with a high modulus usually exhibit a low resistance to tear propagation, and vice versa.

The object of the present invention has surprisingly been achieved by the vulcanization of a rubber compound based on diene rubbers which comprise a special crosslinking agent which provides C₆-bridges, in combination with a selected amount of sulfur, and in the presence of vulcanization accelerators.

The present invention therefore relates to vulcanizable rubber compounds which are characterized in that the vulcanizing system contained in the compounds comprises a) 0.5 to 3.8 parts by weight of compound (I)



where R = (C₆H₅CH₂);

and X = 6,

b) 0.5 to 2 parts by weight sulfur and c) 0.5 to 3.0 parts by weight of vulcanization accelerators, wherein the parts by weight are given in each case with respect to the use of 100 parts by weight of rubber. See page 4, line 1 - page 5, line 14.

VI. ISSUES

Claims 1-11 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Trivette, Jr. (U.S. Patent No. 3,979,369); Wolpers, et al. (U.S. Patent No. 5,342,900); Nordsiek, Kautschuc Gummi Kunststoffe 47, 5 (1994).

As previously submitted by Appellants, it is unclear whether the rejection is over each reference individually or in some combination thereof. Accordingly, since the Office Action does not indicate a combination of the references by language such as, "in view of" Appellants have appealed each reference individually.

VII. GROUPING OF CLAIMS

None of Claims 1-11 will be argued separately in response to the Issues. Therefore, Claims 1-11 stand or fall together.

VIII. ARGUMENTS

A. Appellants' invention as claimed in Claims 1-14 is not obvious in view of Trivette, Jr.

Trivette, Jr. generally discloses the use of compounds of the general formula A-S-S-R-S-S-A' for the vulcanization of rubber, wherein R constitutes almost any divalent organic radical, and A and A' constitute a very large number of accelerator radicals, which include N-substituted thiocarbamoyl radicals amongst others. See Column 2, line 29 - Column 24, line 58. The rubber compounds of Trivette, Jr. are suggested for the bonding or agglutination of natural or synthetic fibers. See Column 26, lines 8-10.

According to Trivette, Jr. the crosslinking agents of the formula A-S-S-R-S-S-A' can be used independently or with sulfur and vulcanization accelerators. The amount of sulfur disclosed by Trivette, Jr. is within the range of from 0.5 to 1.5 parts by weight of sulfur with respect to 100 parts by weight of the rubber. See Column 25, lines 19-24. Trivette, Jr. also discloses that the use of crosslinking agents with amounts of sulfur greater than 1.5 parts by weight result in decreased levels of process safety. See Column 25, lines 24-29.

Upon examination of the examples of Trivette, Jr. there is in fact a deterioration of the level of processing safety (Mooney scorch time) even at an addition of more than 1.0 parts by weight (compare Stock 6 in Table VII (having a t₅/121°C of 32.1 min) with the control compound, Stock 1, Table III (having a t₅/121°C of 32 min)). Also, please compare, Stock 7 in Table VII which contains 1.7 parts by weight sulfur and has a Mooney scorch of 25.7 minutes. Accordingly, Appellants assert that based on the Examples in Trivette, Jr., illustrating the deterioration of processing safety of rubber compounds containing crosslinkers of the general formula A-S-S-R-S-S-A', the disclosure of Trivette, Jr. actually teaches away from the present invention.

Further, Appellants re-assert that "in order to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference. Second, there must be a reasonable expectation of success. Finally, the prior art references must teach or suggest all the claim limitations. The teachings or suggestions to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicants' disclosure." See MPEP § 2142, citing In re Vaeck, 947 F.2d 488, 20 USPQ 2d. 1438 (Fed. Cir. 1991).

Appellants re-submit that Trivette, Jr. does not teach all the claim limitations, specifically Trivette, Jr. does not teach or suggest compound (I) as claimed (i.e. 1,6-bis(N,N-dibenzylthiocarbamylthio)hexane). Further, there is no suggestion of motivation present in Trivette, Jr. to combine, as claimed, 0.5 to 3.8 parts by weight

of NDT, 0.5 to 2.0 parts by weight sulfur and 0.5 to 3.0 parts by weight of at least one vulcanization accelerator. Further, Appellants submit there is no motivation or teaching in Trivette, Jr. to prepare vulcanizates having excellent processing safety in terms of Mooney viscosity, improved modulus, improved resistance to tear propagation and an excellent resistance with respect to reversion with the claimed NDT, sulfur and vulcanization accelerator.

Accordingly, for at least these reasons, Appellants respectfully submit that Trivette, Jr. fails to suggest the presently claimed invention and accordingly Appellants request withdrawal of these rejections.

B. Appellants' invention as claimed in Claims 1-14 is not obvious in view of Wolpers, et al.

Wolpers, et al. discloses a method of producing vulcanized rubber materials with a crosslinking system consisting of 1 to 4.5 parts by weight of 1,2 -bis(N,N-dibenzylthiocarbamoyldithio)ethane or 1,6-bis(N,N-dibenzylthiocarbamoyldithio)hexane, 0.05 to 0.3 parts by weight sulfur, preferably 0.1 to 0.2 parts by weight, and selected types of accelerators with selected loading. See Column 4, lines 4-21.

Despite the assertions in the Office Action, one skilled in the art would not consider 0.3 parts by weight proximate to the claimed 0.5 to 2.0 parts by weight sulfur. The vulcanizates according to Wolpers, et al. have a previously unachieved aging and reversion resistance. See page 7, lines 5-27. From the disclosure of Wolpers, et al. it is unexpected that sulfur loading higher than 0.3 parts by weight would not cause a detrimental effect on the performance of the vulcanizate with respect to aging and reversion resistance. See Column 8, lines 12-23.

Further, Appellants submit that Wolpers, et al. fails to teach each and every element of the claimed invention, i.e., 0.5 to 3.8 parts by weight of NDT, 0.5 to 2.0 parts by weight sulfur and 0.5 to 3.0 parts by weight of at least one vulcanization accelerator

For at least these reasons, Appellants respectfully submit that Wolpers, et al. fails to suggest the presently claimed invention and accordingly Appellants request withdrawal of these rejections.

C. Appellants' invention as claimed in Claims 1-14 is not obvious in view of Nordsiek, et al.

Nordsiek, et al. discloses rubber vulcanization using 1,6-bis(N,N-dibenzylthiocarbamoyldithio)hexane individually or in combination with sulfur. The maximum sulfur loading disclosed in Nordsiek, et al. is 0.2 parts by weight. Appellants submit that for a person skilled in this art, 0.2 parts by weight is not proximate, but far from the claimed sulfur loading of 0.5 to 2.0 parts by weight.

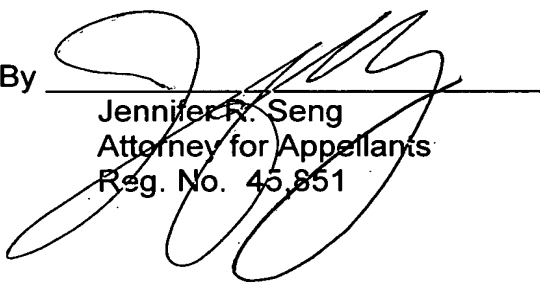
Nordsiek, et al. does not teach or suggest that rubber compositions having sulfur levels above 0.2 parts by weight, yield compounds with a high processing safety and vulcanizates having improved properties before aging with respect to modulus and resistance to tear.

Further, Appellants submit that given the teaching of Trivette, Jr. with regard to high sulfur loading, it would seem counter intuitive for a person skilled in the art to increase the sulfur load in order to improve properties of a vulcanizate.

For at least these reasons, Appellants respectfully submit that Nordsiek, et al. fails to suggest the presently claimed invention and accordingly Appellants request withdrawal of these rejections.

Respectfully submitted,

By

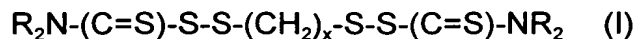

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APPENDIX - CLAIMS ON APPEAL

1 A vulcanizable rubber compound based on diene rubbers comprising a vulcanizing system contained in the compounds comprising

- a) 0.5 to 3.8 parts by weight of compound (I)



wherein R = (C₆H₅CH₂);

and X =6;

- b) 0.5 to 2 parts by weight sulfur; and
c) 0.5 to 3.0 parts by weight of at least one vulcanization accelerator wherein the parts by weight are given in each case with respect to 100 parts by weight of rubber.

2. A vulcanizable rubber compound according to Claim 1, wherein said compound (I) is present in an amount of 0.5 to 3.5 parts by weight.

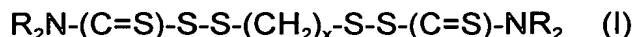
3. A vulcanizable rubber compound according to Claim 1, wherein said sulfur is present in an amount of 0.5 to 1.5 parts by weight.

4. A vulcanizable rubber compound according to Claim 1, wherein said at least one vulcanization accelerator is present in an amount of 0.5 to 2.5 parts by weight.

5. A vulcanizable rubber compound according to Claim 1, wherein said at least one vulcanization accelerator is selected from the group consisting of mercaptobenzthiazole (MBT), dibenzothiazyl disulphide (MBTS), sulphenamides based on MBT or mixtures thereof.

6. Rubber moldings comprising vulcanizable rubber compounds based on diene rubbers and customary additives, comprising a vulcanizing system contained in the compounds comprising

- a) 0.5 to 3.8 parts by weight of compound (I)



wherein R = (C₆H₅CH₂);

and X =6;

- b) 0.5 to 2 parts by weight sulfur; and
- c) 0.5 to 3.0 parts by weight of at least one vulcanization accelerator wherein the parts by weight are given in each case with respect to 100 parts by weight of rubber.
7. Rubber moldings according to Claim 6, wherein said compound (I) is present in an amount of 0.5 to 3.5 parts by weight.
8. Rubber moldings according to Claim 6, wherein said sulfur is present in an amount of 0.5 to 1.5 parts by weight.
9. Rubber moldings according to Claim 6, wherein said vulcanization accelerators are present in an amount of 0.5 to 2.5 parts by weight.
10. Rubber moldings according to Claim 6, wherein said at least one vulcanization accelerator is selected from the group consisting of mercaptobenzthiazole (MBT) or mixtures thereof.
11. Rubber moldings according to Claim 6, wherein said rubber molding is a molding for a tire component.
12. The vulcanizable rubber compound according to Claim 1, wherein the compound further comprises a rubber additive(s).
13. The vulcanizable rubber compound according to Claim 5, wherein the sulphenamide comprising MBT is selected from the group consisting of benzothiazyl-2-cyclohexylsulphenamide (CBS), benzothiazyl-2-dicyclohexylsulphenamide (DCBS), benzothiazyl-2-tert.-butylsulphenamide (TBBS) and benzothiazyl-2-sulphenomorpholide (MBS) or mixtures thereof

14. The rubber moldings according to Claim 10, wherein the sulphenamide comprising MBT is selected from the group consisting of benzothiazyl-2-cyclohexylsulphenamide (CBS), benzothiazyl-2-dicyclohexyl-sulphenamide (DCBS), benzothiazyl-2-tert.-butylsulphen-amide (TBBS) and benzothiazyl-2-sulphenomorpholide (MBS) or mixtures thereof.